

CLAIMS

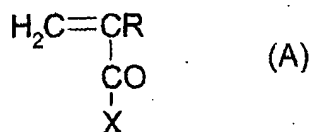
1. Process for dissolving at least one lipophilic compound in an aqueous
 5 phase, characterized in that it comprises the step of associating the said lipophilic compound with an effective amount of at least one amphiphilic block copolymer comprising at least one ionic and/or at least one nonionic hydrophilic polymer block, and at least one hydrophobic polymer block obtained from at least one hydrophobic monomer chosen from :
- 10 - styrene and its derivatives such as 4-butylstyrene,
 - vinyl acetate of formula $\text{CH}_2=\text{CH}-\text{OCOCH}_3$,
 - vinyl ethers of formula $\text{CH}_2=\text{CHOR}$ in which R is a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 6 carbon atoms,
- 15 - acrylonitrile,
 - vinyl chloride and vinylidene chloride,
 - caprolactone and caprolactam,
 - alkenes such as ethylene, propylene, butylene and butadiene,
 - alkylene oxides containing at least 4 carbon atoms and preferably from 4
 20 to 6 carbon atoms,
 - silicone derivatives producing, after polymerization, silicone polymers such as polydimethylsiloxane,
 - hydrophobic vinyl monomers of formula (A) below:
- $$\begin{array}{c} \text{H}_2\text{C}=\text{CR} \\ | \\ \text{CO} \\ | \\ \text{X} \end{array} \quad (\text{A})$$
- 25 in which:
 - R is chosen from H, $-\text{CH}_3$, $-\text{C}_2\text{H}_5$ and $-\text{C}_3\text{H}_7$,
 - X is chosen from:
 - alkyl oxides of $-\text{OR}'$ type in which R' is a linear, cyclic or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to
 30 22 carbon atoms, optionally substituted with a halogen atom (iodine, bromine, chlorine or fluorine); a sulphonate group ($-\text{SO}_3^-$), a sulphate group ($-\text{SO}_4^-$), a phosphate group ($-\text{PO}_4\text{H}_2^-$); a hydroxyl group ($-\text{OH}$); a primary amine group ($-\text{NH}_2$); a secondary amine group ($-\text{NHR}_1$), a tertiary amine group ($-\text{NR}_1\text{R}_2$) or a quaternary amine group ($-\text{N}^+\text{R}_1\text{R}_2\text{R}_3$) with R₁, R₂ and
 35 R₃ being, independently of each other, a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 22 carbon atoms, with the proviso that the sum of the carbon atoms of R' + R₁ + R₂ + R₃ does not exceed 22; R' may also be a perfluoroalkyl radical, preferably containing from 1 to 18 carbon atoms;

--NH₂, -NHR' and -NR'R'' groups in which R' and R'' are, independently of each other, linear, cyclic or branched, saturated or unsaturated hydrocarbon-based radicals containing from 1 to 22 carbon atoms, with the proviso that the total number of carbon atoms of R' + R'' does not exceed 22, R' and R'' optionally being substituted with a halogen atom (iodine, bromine, chlorine or fluorine); a hydroxyl group (-OH); a sulphonic group (-SO₃⁻); a sulphate group (-SO₄⁻); a phosphate group (-PO₄H₂⁻); a primary amine group (-NH₂); a secondary amine group (-NHR₁), a tertiary amine group (-NR₁R₂) and/or a quaternary amine group (-N⁺R₁R₂R₃) with R₁, R₂ and R₃ being, independently of each other, a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 22 carbon atoms, with the proviso that the sum of the carbon atoms of R' + R'' + R₁ + R₂ + R₃ does not exceed 22; R' and R'' may also be perfluoroalkyl radicals, preferably containing from 1 to 18 carbon atoms.

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2. Process according to claim 1, characterized in that the ionic hydrophilic polymer block is polyethyleneimine or is obtained from water-soluble monomers or salts thereof, chosen from

- (meth)acrylic acid,
- acrylamido-2-methylpropanesulphonic (AMPS) acid,
- styrenesulphonic acid,
- vinylsulphonic acid and (meth)allylsulphonic acid,
- vinylphosphonic acid,
- maleic anhydride,
- itaconic acid,
- dimethyldiallylammonium chloride,
- quaternized dimethylaminoethyl methacrylate (DMAEMA),
- (meth)acrylamidopropyltrimethylammonium chloride (APTAC and MAPTAC),
- methylvinylimidazolium chloride,
- hydrophilic vinyl monomers of formula (A) below:



in which:

- R is chosen from H, -CH₃, -C₂H₅ and -C₃H₇,
- X is chosen from:

- alkyl oxides of -OR' type in which R' is a linear, cyclic or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 6 carbon atoms, substituted with at least one sulphonic group (-SO₃⁻)

and/or sulphate group ($-\text{SO}_4^-$) and/or phosphate group ($-\text{PO}_4\text{H}_2^-$) and/or quaternary amine group ($-\text{N}^+\text{R}_1\text{R}_2\text{R}_3$) with R_1 , R_2 and R_3 being, independently of each other, a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 6 carbon atoms, with the proviso that the sum of the atoms of $\text{R}' + \text{R}_1 + \text{R}_2 + \text{R}_3$ does not exceed 6; the radical R' being optionally substituted with a halogen atom (iodine, bromine, chlorine or fluorine); a hydroxyl group ($-\text{OH}$); a primary amine group ($-\text{NH}_2$); a secondary amine group ($-\text{NHR}_1$) or a tertiary amine group ($-\text{NR}_1\text{R}_2$) with R_1 , R_2 being, independently of each other, a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 6 carbon atoms, with the proviso that the sum of the carbon atoms of $\text{R}' + \text{R}_1 + \text{R}_2$ does not exceed 6;

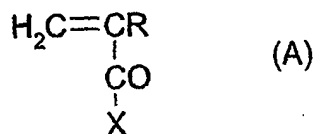
- $-\text{NH}_2$, $-\text{NHR}'$ and $-\text{NR}'\text{R}''$ groups in which R' and R'' are, independently of each other, linear, cyclic or branched, saturated or unsaturated hydrocarbon-based radicals containing from 1 to 6 carbon atoms, with the proviso that the total number of carbon atoms of $\text{R}' + \text{R}''$ does not exceed 6, R' and/or R'' optionally being substituted with at least one sulphonic group ($-\text{SO}_3^-$) and/or sulphate group ($-\text{SO}_4^-$) and/or phosphate group ($-\text{PO}_4\text{H}_2^-$) and/or quaternary amine group ($-\text{N}^+\text{R}_1\text{R}_2\text{R}_3$) with R_1 , R_2 and R_3 being, independently of each other, a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 6 carbon atoms, with the proviso that the sum of the atoms of $\text{R}' + \text{R}_1 + \text{R}_2 + \text{R}_3$ does not exceed 6; the radicals R' and/or R'' being optionally substituted with a halogen atom (iodine, bromine, chlorine or fluorine); a hydroxyl group ($-\text{OH}$); a primary amine group ($-\text{NH}_2$); a secondary amine group ($-\text{NHR}_1$) or a tertiary amine group ($-\text{NR}_1\text{R}_2$) with R_1 , R_2 being, independently of each other, a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 6 carbon atoms, with the proviso that the sum of the carbon atoms of $\text{R}' + \text{R}'' + \text{R}_1 + \text{R}_2$ does not exceed 6.

3. Process according to any one of the preceding claims, characterized in that the ionic hydrophilic block is chosen from (meth)acrylic acid.

4. Process according to any one of the preceding claims, characterized in that the nonionic hydrophilic polymer block is of polyoxyalkylenated type, for instance polyoxyethylene, or is polyvinylpyrrolidone (PVP), or is obtained from water-soluble monomers chosen from

- (meth)acrylamide,
- N-vinylacetamide and N-methyl-N-vinylacetamide,
- N-vinylformamide and N-methyl-N-vinylformamide,

- N-vinyl lactams comprising a cyclic alkyl group containing from 4 to 9 carbon atoms, such as N-vinylpyrrolidone, N-butyrolactam and N-vinyl-caprolactam,
- vinyl alcohol of formula $\text{CH}_2=\text{CHOH}$,
- 5 - glycidyl (meth)acrylate,
- hydrophilic vinyl monomers of formula (A) below:



in which:

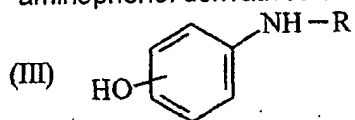
- 10 - R is chosen from H, $-\text{CH}_3$, $-\text{C}_2\text{H}_5$ and $-\text{C}_3\text{H}_7$,
- X is chosen from:
 - alkyl oxides of $-\text{OR}'$ type in which R' is a linear, cyclic or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 6 carbon atoms, optionally substituted with a halogen atom (iodine, bromine, chlorine or fluorine); a hydroxyl group ($-\text{OH}$); a primary amine group ($-\text{NH}_2$);
 - 15 a secondary amine group ($-\text{NHR}_1$) or a tertiary amine group ($-\text{NR}_1\text{R}_2$) with R₁ and R₂ being, independently of each other, a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 6 carbon atoms, with the proviso that the sum of the carbon atoms of R' +
 - 20 R₁ + R₂ does not exceed 6;
 - $-\text{NH}_2$, $-\text{NHR}'$ and $-\text{NR}'\text{R}''$ groups in which R' and R'' are, independently of each other, linear, cyclic or branched, saturated or unsaturated hydrocarbon-based radicals containing from 1 to 6 carbon atoms, with the proviso that the total number of carbon atoms of R' + R'' does not exceed 6,
 - 25 R' and R'' optionally being substituted with a halogen atom (iodine, bromine, chlorine or fluorine); a hydroxyl group ($-\text{OH}$); a primary amine group ($-\text{NH}_2$); a secondary amine group ($-\text{NHR}_1$) or a tertiary amine group ($-\text{NR}_1\text{R}_2$) with R₁ and R₂ being, independently of each other, a linear or branched, saturated or unsaturated hydrocarbon-based radical containing
 - 30 from 1 to 6 carbon atoms, with the proviso that the sum of the carbon atoms of R' + R'' + R₁ + R₂ does not exceed 6.

5. Process according to Claim 4, characterized in that the nonionic hydrophilic polymer block is chosen from polyethylene oxide and polyvinylpyrrolidone.

6. Process according to any one of the preceding claims, characterized in that the hydrophilic polymer block is nonionic.

7. Process according to any one of the preceding claims, characterized in that the hydrophobic polymer block is obtained from at least one hydrophobic monomer chosen from styrene, tert-butylstyrene, methyl methacrylate, ethyl (meth)acrylate, n-butyl (meth)acrylate, tert-butyl (meth)acrylate, cyclohexyl acrylate, isobornyl acrylate, 2-ethylhexyl acrylate, ethyl perfluorooctyl acrylate, trifluoromethyl (meth)acrylate, polybutylene oxide or polyoxybutylene (POB), butadiene, ethylene, propylene and butylene.
8. Process according to any one of the preceding claims, characterized in that the block copolymer is chosen from the following block copolymers:
- polystyrene/polyoxyethylene
 - polymethyl methacrylate/polyoxyethylene
 - polybutyl methacrylate/polyoxyethylene
 - polyoxybutylene/polyoxyethylene
 - polycaprolactone/polyoxyethylene
 - polyethylene/polyoxyethylene
 - polyoxyethylene/polyoxybutylene/polyoxyethylene.
9. Process according to any one of the preceding claims, characterized in that the molecular weight of the block copolymer is between 1 000 and 500 000, preferably from 2000 to 100 000.
10. Process according to any one of the preceding claims, characterized in that the weight ratio A/B between the hydrophilic block A and the hydrophobic block B ratio is between 1/100 and 50/1.
11. Process according to any one of the preceding claims, characterized in that the weight concentration ratio between the lipophilic compound and the amphiphilic block copolymer is between 0.005 and 0.5 and preferably between 0.005 and 0.2.
12. Process according to any one of the preceding claims, characterized in that the lipophilic compound is chosen from :
- emollients, anti-inflammatory agents, antibacterial agents, antifungal agents, antiviral agents, anti-seborrhoeic agents, antiacne agents, keratolytic agents, antihistamines, anaesthetics, cicatrizing agents, pigmentation modifiers, tanning accelerators, artificial tanning agents, liporegulators, anti-ageing and anti-wrinkle agents, refreshing agents, vascular protectors, insect repellants, deodorants, antidandruff agents, agents for preventing hair loss,

- essential oils, which may be chosen especially from eucalyptus oil, lavandin oil, lavender oil, vetiver oil, Litsea cubeba oil, lemon oil, sandalwood oil, rosemary oil, camomile oil, savory oil, nutmeg oil, cinnamon oil, hyssop oil, caraway oil, orange oil, geraniol oil and cade oil, fragrances,
- 5 - sunscreens, antioxidants, free-radical scavengers and moisturizers;
- vitamins such as vitamin A (retinol) or esters thereof, vitamin E or esters thereof such as tocopheryl acetate, vitamin D or derivatives thereof and vitamin F or derivatives thereof; carotenes such as β -carotene and derivatives thereof such as lycopene, and salicylic acid derivatives;
- 10 - dehydroepiandrosterone (DHEA) and its biological precursors and derivatives, with the exception of cholesterol and its esters and plant sterols such as phytosterols and sitosterols, and esters thereof,
- pentacyclic triterpene acids such as ursolic acid and oleanolic acid,
- hydroxystilbenes,
- 15 - isoflavonoids,
- aminophenol derivatives of formula



in which R is a radical corresponding to one of the formulae (i), (ii) or (iii) below

- 20 (i) -CO-NR₁R₂
- (ii) -CO-O-R₃
- (iii) -SO₂-R₃

in which

- R₁ represents a hydrogen atom or a linear or branched, saturated or
- 25 unsaturated, optionally hydroxylated C₁₋₆ alkyl radical,
- R₂ represents a hydrogen atom or a radical chosen from saturated or unsaturated, linear, cyclic or branched, C₁₂ to C₃₀ optionally hydroxylated alkyl radicals, and
- R₃ represents a radical chosen from saturated or unsaturated, linear,
- 30 branched or cyclic C₁₂ to C₃₀ alkyl radicals, including fused polycyclic radicals, which are optionally hydroxylated.

13. Process according to Claim 12, characterized in that the salicylic acid derivatives are chosen from the 5-n-octanoylsalicylic, 5-n-decanoylsalicylic,
- 35 5-n-dodecanoylsalicylic, 5-n-octylsalicylic, 5-n-heptyloxysalicylic, 4-n-heptyloxysalicylic, 5-tert-octylsalicylic, 3-tert-butyl-5-methylsalicylic, 3-tert-butyl-6-methylsalicylic, 3,5-diisopropylsalicylic, 5-butoxysalicylic, 5-octyloxysalicylic, 5-propanoylsalicylic, 5-n-hexadecanoylsalicylic,

5-n-oleoylsalicylic and 5-benzoylsalicylic acid derivatives, monovalent and divalent salts thereof, and mixtures thereof.

14. Process according to Claim 12, characterized in that the sunscreens
5 are chosen from anthranilates; cinnamic derivatives; dibenzoylmethane derivatives; salicylic derivatives; camphor derivatives; triazine derivatives, preferably 1,3,5-triazine derivatives; benzophenone derivatives; β,β' -diphenylacrylate derivatives; benzotriazole derivatives; benzalmalonate derivatives; benzimidazole derivatives; imidazolines; bis-benzazoly
10 derivatives; p-aminobenzoic acid (PABA) derivatives; methylene-bis(hydroxyphenylbenzotriazole) derivatives; screening polymers and screening silicones; dimers derived from α -alkylstyrene; 4,4-diarylbutadienes, and mixtures thereof.

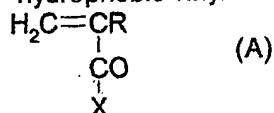
15. Process according to Claim 14 characterized in that the 1,3,5-triazine derivatives are chosen from the following compounds:
- 2-[(p-(tert-butylamido)anilino)-4,6-bis[(p-(2'-ethylhexyl-1'-oxycarbonyl)anilino)-1,3,5-triazine,
- 2,4,6-tris[p'-(2'-ethylhexyl-1'-oxycarbonyl)anilino]-1,3,5-triazine,
20 - 2,4-bis[[4-(2-ethylhexyloxy)-2-hydroxy]phenyl]-6-(4-methoxyphenyl)-1,3,5-triazine,
- 2,4,6-tris(diisobutyl 4'-aminobenzalmalonate)-s-triazine,
and mixtures thereof.

25 16. Process according to Claim 14, characterized in that the dibenzoylmethane derivative is butylmethoxydibenzoylmethane.

17. Process according to Claim 12, characterized in that the lipophilic compound is chosen from dehydroepiandrosterone (DHEA), DHEA sul-
30 phate, 7-hydroxy-DHEA, 7-keto-DHEA, prednisolone, prednisone, progesterone, pregnenolone, testosterone, diosgenin, hecogenin, ursolic acid, oleanolic acid, resveratrol and N-cholesteryloxycarbonyl-4-aminophenol, and isoflavonoids whose solubility in water at room temperature (25°C) is less than 0.01%.

35 18. Cosmetic composition comprising at least one aqueous phase, at least one lipophilic compound and an effective amount of at least one block amphiphilic copolymer comprising at least one ionic and/or at least one nonionic hydrophilic polymer block, and at least one hydrophobic polymer
40 block obtained from at least one hydrophobic monomer chosen from :
- styrene and its derivatives such as 4-butylstyrene,

- vinyl acetate of formula $\text{CH}_2=\text{CH}-\text{OCOCH}_3$,
- vinyl ethers of formula $\text{CH}_2=\text{CHOR}$ in which R is a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 6 carbon atoms,
- 5 - acrylonitrile,
- vinyl chloride and vinylidene chloride,
- caprolactone and caprolactam,
- alkenes such as ethylene, propylene, butylene and butadiene,
- alkylene oxides containing at least 4 carbon atoms and preferably from 4
- 10 to 6 carbon atoms,
- silicone derivatives producing, after polymerization, silicone polymers such as polydimethylsiloxane,
- hydrophobic vinyl monomers of formula (A) below:



15 in which:

- R is chosen from H, $-\text{CH}_3$, $-\text{C}_2\text{H}_5$ and $-\text{C}_3\text{H}_7$,
- X is chosen from:
 - alkyl oxides of $-\text{OR}'$ type in which R' is a linear, cyclic or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to
 - 20 22 carbon atoms, optionally substituted with a halogen atom (iodine, bromine, chlorine or fluorine); a sulphonic group ($-\text{SO}_3^-$), a sulphate group ($-\text{SO}_4^-$), a phosphate group ($-\text{PO}_4\text{H}_2^-$); a hydroxyl group ($-\text{OH}$); a primary amine group ($-\text{NH}_2$); a secondary amine group ($-\text{NHR}_1$), a tertiary amine group ($-\text{NR}_1\text{R}_2$) or a quaternary amine group ($-\text{N}^+\text{R}_1\text{R}_2\text{R}_3$) with R₁, R₂ and
 - 25 R₃ being, independently of each other, a linear or branched, saturated or unsaturated hydrocarbon-based radical containing from 1 to 22 carbon atoms, with the proviso that the sum of the carbon atoms of R' + R₁ + R₂ + R₃ does not exceed 22; R' may also be a perfluoroalkyl radical, preferably containing from 1 to 18 carbon atoms;
 - 30 - $-\text{NH}_2$, $-\text{NHR}'$ and $-\text{NR}'\text{R}''$ groups in which R' and R'' are, independently of each other, linear, cyclic or branched, saturated or unsaturated hydrocarbon-based radicals containing from 1 to 22 carbon atoms, with the proviso that the total number of carbon atoms of R' + R'' does not exceed 22, R' and R'' optionally being substituted with a halogen atom (iodine,
 - 35 bromine, chlorine or fluorine); a hydroxyl group ($-\text{OH}$); a sulphonic group ($-\text{SO}_3^-$); a sulphate group ($-\text{SO}_4^-$); a phosphate group ($-\text{PO}_4\text{H}_2^-$); a primary amine group ($-\text{NH}_2$); a secondary amine group ($-\text{NHR}_1$), a tertiary amine group ($-\text{NR}_1\text{R}_2$) and/or a quaternary amine group ($-\text{N}^+\text{R}_1\text{R}_2\text{R}_3$) with R₁, R₂ and R₃ being, independently of each other, a linear or branched, saturated

or unsaturated hydrocarbon-based radical containing from 1 to 22 carbon atoms, with the proviso that the sum of the carbon atoms of $R' + R'' + R_1 + R_2 + R_3$ does not exceed 22; R' and R'' may also be perfluoroalkyl radicals, preferably containing from 1 to 18 carbon atoms.

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19. Composition according to claim 18, characterized in that the weight concentration ratio between the lipophilic compound and the amphiphilic block copolymer is between 0.005 and 0.5 and preferably between 0.005 and 0.2.

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20. Composition according to any one of Claims 18 to 19, characterized in that the lipophilic compound is present in the composition in weight contents of between 0.001% and 10% of the total weight of the composition.

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21. Composition according to any one of Claims 18 to 20, characterized in that it also contains one or more formulation adjuvants chosen from pigments, nanopigments, fatty substances, organic solvents, thickeners, softeners, free-radical scavengers, stabilizers, emollients, silicones, α -hydroxy acids, antifoams, moisturizers, vitamins, preserving agents, surfactants, fillers, sequestering agents, polymers, propellants, acidifying or basifying agents, dyes, opacifiers.

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22. Composition according to any one of Claims 18 to 21, characterized in that it is a composition for protecting the human epidermis or the hair against ultraviolet rays, as antisun compositions; or is a makeup product; or is a composition for protecting the hair.

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